Perspective

Sanitation Systems (/perspective/sanitation-systems-perspective)

Section

Sanitation Technologies (/sanitation-systems/sanitation-technologies)

Factsheet

Double Ventilated Improved Pit (VIP)

العربية (/ar/sanitation-systems/sanitation-technologies/double-ventilated-improved-pit-(vip))

Applicable to	Application level	Management level	Inputs	Outputs
System 2 (/humanitarian-crises/rural-settings/sanitation/sanitation-systems/system-2%3A-waterless-pit-system-without-sludge-production)	City Household Neighborhood	Household Public Shared	Faeces, Excreta + Dry Cleansing Materials + Anal Cleansing Water	Pit Humus

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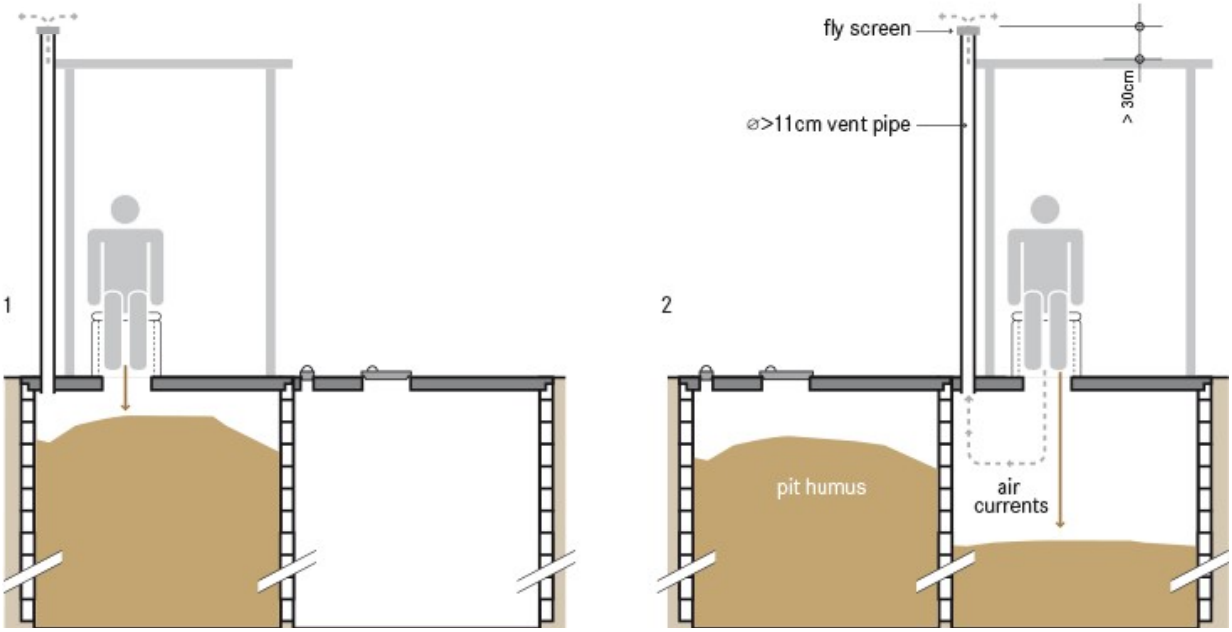
Adapted from

Compendium of Sanitation Systems and Technologies. 2nd Revised Edition (/node/5587)



Executive Summary

The double VIP has almost the same design as the single VIP with the added advantage of a second pit that allows it to be used continuously and permits safer and easier emptying.

Advantages

- Longer life than single VIP (indefinite if maintained properly)
- Excavation of humus is easier than faecal sludge
- Significant reduction in pathogens
- Potential for use of stored faecal material as soil conditioner
- Flies and odours are significantly reduced (compared to non-ventilated pits)
- Can be built and repaired with locally available materials

Disadvantages

- Manual removal of humus is required
- Possible contamination of groundwater
- Higher capital costs than Single VIP; but reduced operating costs if self-emptied

In	Out
Urine, Faeces, Excreta, Blackwater, Dry Cleansing Materials Anal Cleansing Water	Sludge, Compost/Biosolids

Introduction

The design of a VIP is nearly the same as a normal **pit latrine (https://sswm.info/node/8237)** – made of a superstructure, a pit cover slab and a hole for defecation. Different is only the ventilation pipe, provided with a durable fly screen on the top (SANIMAS 2005). Despite their simplicity, well-designed VIPs can be completely smell-free. The ventilation also allows odours to escape and minimises the attraction for flies (TILLEY et al., 2014).

By using two pits, one pit can be used, while the content of the second rests, drains, reduces in volume, and degrades. When the second pit is almost full (the excreta is 50 cm from the top of the pit), it is covered, and the content of the first pit is removed. Due to the extended resting time (at least 1 or 2 years after several years of filling), the material within the pit is partially sanitised and humus-like.

Design considerations

The superstructure may either extend over both holes or it may be designed to move from one pit to the other. In either case, the pit that is not being filled should be fully covered and sealed to prevent water, garbage and animals, or people from falling into the pit.

The ventilation of the two pits can be accomplished using one ventilation pipe moved back and forth between the pits, or each pit can be equipped with its own dedicated pipe. The two pits in the double VIP are continually used and should be well lined and supported to ensure longevity.

Health aspects/acceptance

The double VIP can be a very clean, comfortable and well accepted sanitation option, in some cases even more so than a water-based technology. However, some health concerns exist:

- Leachate can contaminate groundwater;
- Pits are susceptible to failure and/or overflowing during floods;
- Health risks from flies are not completely removed by ventilation.

Operation & maintenance

To keep the double VIP free of flies and odours, regular cleaning and maintenance is required. Dead flies, spider webs, dust and other debris should be removed from the ventilation screen to ensure a good flow of air. The out of service pit should be well sealed to reduce water infiltration and a proper alternating schedule must be maintained.

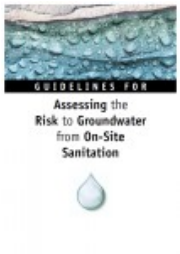
Applicability

The double VIP is more appropriate than the single VIP for denser, peri-urban areas. After the resting time, the soil-like material is manually emptied (it is dug out, not pumped out), so vacuum truck access to the pits is not necessary.

The double VIP technology will only work properly if the two pits are used sequentially and not concurrently. Therefore, an adequate cover for the out of service pit is required. Double VIPs are especially appropriate when water is scarce and where there is a low groundwater table. They should be located in an area with a good breeze to allow for proper ventilation. They are not suited for rocky or compacted soils (that are difficult to dig) or for areas that flood frequently.

Library References

Guidelines for Assessing the Risk to Groundwater from On-Site Sanitation



Many people in developing countries rely upon untreated groundwater supplies for their drinking water (e.g. from drilled boreholes, tube wells, dug wells or springs). The introduction of on-site sanitation systems might lead to groundwater contamination. The purpose of this manual is to provide guidance on how to assess and reduce the risk of contamination of groundwater supplies from on-site sanitation systems and is aimed at those responsible for planning low cost water supply and sanitation schemes.

ARGOSS (2001): Guidelines for Assessing the Risk to Groundwater from On-Site Sanitation. (= Commissioned Report , 142). Keyworth: British Geological Survey **URL (https://www.gov.uk/dfid-research-outputs/argoss-2001-guidelines-for-assessing-the-risk-to-groundwater-from-on-site-sanitation-report-no-cr-01-142)** [Accessed: 11.05.2019]

A Guide to the Development of On-site Sanitation

The publication presents appropriate technologies for sanitation and highlights socio-economic aspects of planning and implementing. Emphasis is given to household-level sanitation improvements for urban areas, as well as rural areas and small communities. Background information on sanitation, in-depth technical information on the design, construction, operation and

Pit Latrines and Their Impacts on Groundwater Quality: a systematic Review

This study reviews empirical studies on the impact of pit latrines on groundwater quality and identifies knowledge gaps regarding the potential and consequences of groundwater contamination by latrines.

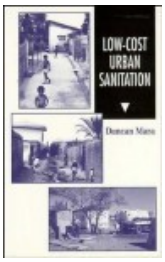
Graham, J. ; Polizotto, M.L. (2013): Pit Latrines and Their Impacts on Groundwater Quality: a systematic Review. Advance Publication. In: Environmental Health Perspectives: **URL (http://ehp.niehs.nih.gov/1206028/)** [Accessed: 09.04.2013]

The design of Ventilated Improved Pit Latrines

The purpose of this paper is to discuss general design criteria for VIP latrines and to review recent developments in VIP latrine design.

MARA, D.D. (1984): The design of Ventilated Improved Pit Latrines. UNDP Interregional Project. (= United Nations Development Programme Interregional Project , 47). Washington: The World Bank **URL (http://documents.worldbank.org/curated/en/1984/01/437925/design-ventilated-improved-pit-latrines)** [Accessed: 11.10.2013]

Low-cost Urban Sanitation



This book covers the public health, technical, socioeconomic, sociocultural and institutional aspects of sanitation in towns and cities of developing countries. The text features excreta-related diseases and the use of sanitation to reduce their transmission. The sanitation technologies covered in detail are VIP latrines, pour-flush toilets, septic tanks, settled sewerage and simplified sewerage, with additional chapters on sullage disposal, pit emptying, and sewage treatment and reuse. Sociocultural constraints on sanitation systems and their socioeconomic costing are described, together with hygiene education, which is essential in order to achieve maximum benefits to health. The text also explains how to choose the most appropriate sanitation option for a given low-income community. Finally, institutional aspects are reviewed, including effective sanitation programme planning, monitoring and evaluation.

MARA, D. (1996): Low-cost Urban Sanitation. United Kingdom: Wiley

Ecological Toilets

This book describes how to construct Arborloo toilets and how it can be upgraded to VIPs at a later stage.

MORGAN, P. EcoSanRes (2009): Ecological Toilets. (pdf presentation). Stockholm: Stockholm Environment Institute **URL (http://www.ecosanres.org/pdf_files/EcologicalToilets-PeterMorgan-Mar2009.pdf)** [Accessed: 09.05.2019]

Informed Choice Catalogue

This informed choice catalogue for community based wastewater treatment technologies helps to identify suitable sanitation options and facilitates the assessment of different sanitation system components with regard to stakeholder preferences. A powerful tool for technical bottom-up planning giving overall information about technical options at a "glance".

SANIMAS (2005): Informed Choice Catalogue. pdf presentation. BORDA and USAID **URL (https://es.slideshare.net/YuyunIsmawati/icc-sanimas-2003-yi)** [Accessed: 29.05.2019]

Compendium of Sanitation Systems and Technologies. 2nd Revised Edition

This compendium gives a systematic overview on different sanitation systems and technologies and describes a wide range of available low-cost sanitation technologies.

TILLEY, E. ULRICH, L. LUETHI, C. REYMOND, P. ZURBRUEGG, C. (2014): Compendium of Sanitation Systems and Technologies. 2nd Revised Edition. Duebendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag) **URL (http://www.eawag.ch/forschung/sandec/publikationen/compendium_e/index_EN)** [Accessed: 28.07.2014] **PDF (/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Compendium%20of%20Sanitation%20Systems%20and%20Technc**

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